

Time Domain Terahertz Axial Computed Tomography Non Destructive Evaluation, Phase II

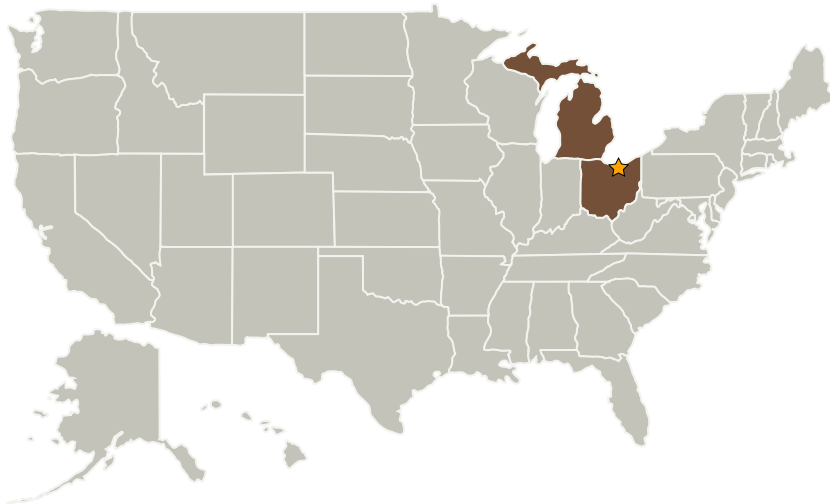
Completed Technology Project (2009 - 2012)



Project Introduction

In this Phase 2 project, we propose to develop, construct, and deliver to NASA a computed axial tomography time-domain terahertz (CT TD-THz) non destructive evaluation (NDE) system which will provide true three dimensional images of aerospace polymer, ceramic, and composite structures. Traditional time domain terahertz reflection tomographic imaging captures only a single view of an object, generating images of laminar structure similar to an ultrasound "B-Scan". This reflection tomographic imaging is limited, however, in revealing only the laminar structure which presents a clear specular reflection from each interface. Furthermore, traditional time domain terahertz reflection tomographic imaging has substantial difficulty in determining the layer index of refraction and absorption properties without ambiguity. In Phase 1 we demonstrated the feasibility TD-THz axial computed tomography to generate cross-sectional slices of aerospace materials. This method acquires not one view, but many radial axial views, generating a sinogram which can be used to reconstruct images using a derivative of standard X-Ray CT filtered back-projection. The sinogram can be generated by the transmission absorbance, transmission time of flight, and, in principle, reflection measurements. The reconstructed TD-THz CT images are 3D maps of the absorption coefficients and/or the index of refraction of the subsurface material.

Primary U.S. Work Locations and Key Partners



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Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Organizational Responsibility	1
Project Transitions	2
Project Management	2
Technology Areas	2

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Picometrix, LLC	Supporting Organization	Industry	Ann Arbor, Michigan

Primary U.S. Work Locations	
Michigan	Ohio

Project Transitions

**February 2009:** Project Start**April 2012:** Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.4 Manufacturing
 - └ TX12.4.5 Nondestructive Evaluation and Sensors